Vehicle Miles of Travel Trends in Minnesota

1992-2018

Office of Transportation System Management
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DEPARTMENT OF TRANSPORTATION

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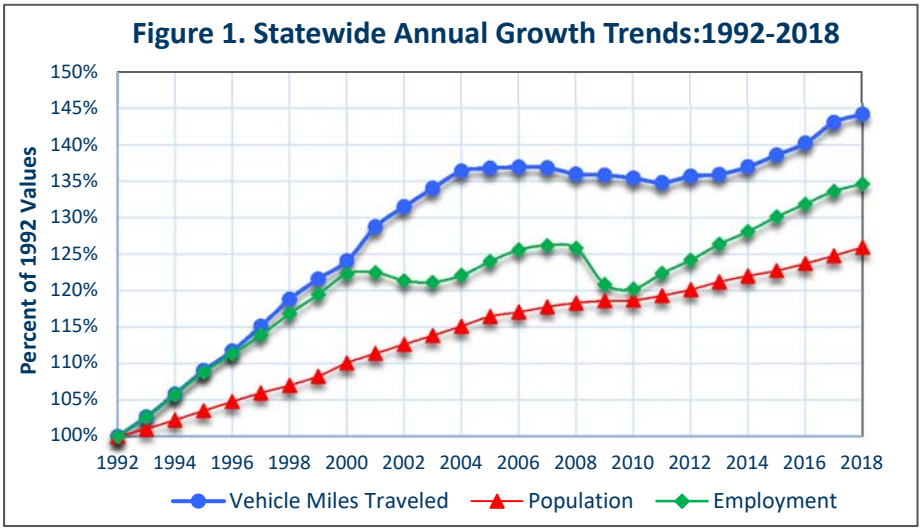
MnDOT Office of Transportation System Management

Introduction

The Office of Transportation System Management (OTSM) at the Minnesota Department of Transportation (MnDOT) computes and reports vehicle miles of travel (VMT) for the roadway network in Minnesota. VMT is commonly used to measure the demand on our transportation network. It is defined as the total number of miles traveled by all vehicles during a certain time period, usually daily or annually. Daily VMT is computed by multiplying average annual daily traffic (AADT) by the centerline distance (in miles) of each roadway segment.

Heavy commercial VMT (HCVMT) is calculated by multiplying heavy commercial AADT by the segment length. In Minnesota traffic data are collected on all state highways, county roads, and municipal state-aid streets on a cyclical basis. Until recently, MnDOT only counted heavy commercial traffic on the state trunk highway system; hence HCVMT trends can only be accurately calculated on the state highway system which includes Interstate, US, and MN trunk highways.

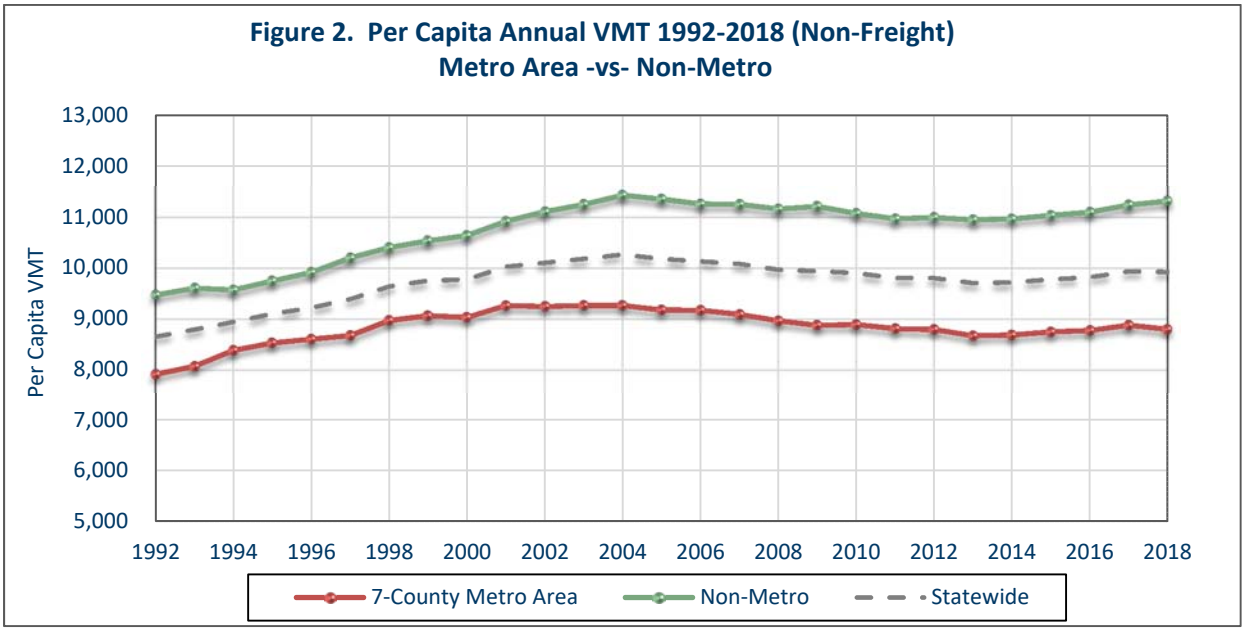
In previous decades Minnesota had seen steady growth in VMT. However, VMT growth in Minnesota was virtually flat from 2004 to 2013. In 2014 VMT began increasing again to a new high of 60.4 billion in 2018, a 0.7 % [1] increase over 2017. Nationally, VMT changed by 0.4% [2] to 3,224.9 billion miles as of December 31, 2018. It has become more difficult for traffic forecasters to project VMT growth into the future due to changes in VMT trends. The purpose of this report is to monitor and report on VMT trends and the most current VMT and HCVMT conditions on Minnesota roads. This report also explores trends in several major factors that impact VMT such as population, employment, and gas prices in Minnesota.



Source: Minnesota State Demographic Center;
Minnesota Department of Employment and Economic Development;
MnDOT, Office of Transportation System Management

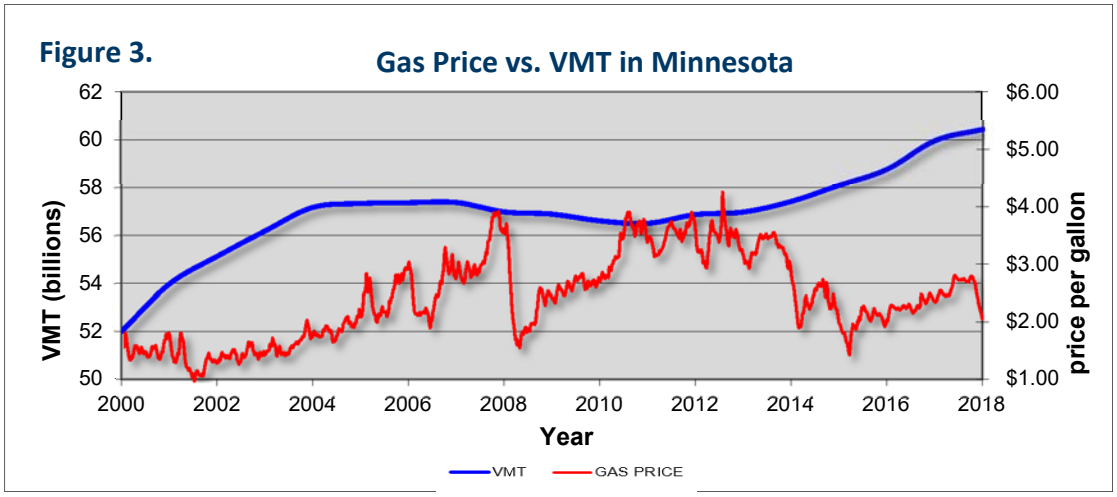
Figure 1 illustrates changes in VMT, population, and employment in Minnesota between 1992 and 2018. During most of the 27-year period, growth in VMT has outpaced population and employment. VMT increased by a total of 44.2%, population increased 26.0%, and employment increased 34.6%.

1. For more information on how to calculate VMT, see appendix A.
2. Estimated on FHWA's Traffic Volume Trends Report, which is based on a sample of automatic traffic recorders from each state.



Source: Minnesota State Demographic Center;
MnDOT, Office of Transportation System Management

Another way to look at VMT trends is to calculate per capita VMT; that is VMT divided by the population. This measure is the average vehicle miles people travel. Although population has been increasing, per capita VMT has decreased since 2004 in both the metro and non-metro areas as illustrated in Figure 2. The decrease means that individuals are driving less. The 2018 per capita travel in the Metro Area has fallen below 1998 levels.

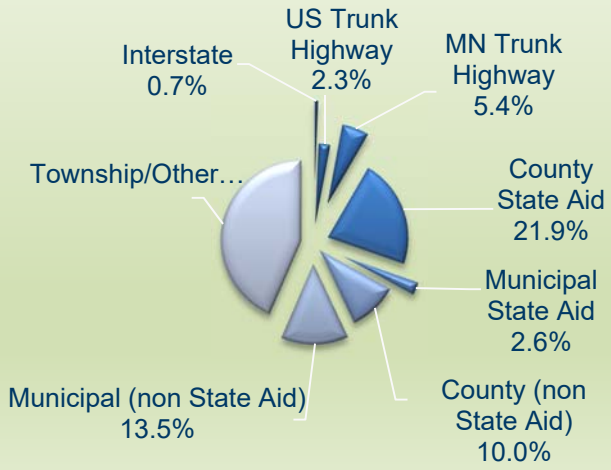


Source: Mn/DOT, Budget Section, Office of Finance;
Mn/DOT, Office of Transportation System Management

It appears that as gas prices increased motorists began taking fewer trips, carpooling, and using more public transportation. In the Twin Cities metro area transit ridership had been increasing since 2004, although in 2008 and 2009 it decreased by 6.1% [3] due to the decline in gas price from 2008 to 2009. The gas price vs VMT graph in Figure 3 shows that as gas prices rose VMT growth flattened beginning in 2004, but began increasing again in 2013 as gas prices began to fall. Variability in gas prices and changes in driver behavior create a major challenge for traffic forecasters, transportation planners, and transportation engineers with respect to projecting future VMT.

3. The ridership information is from Metropolitan Council.
4. This includes all types of gas: E85, M85, diesel combined, and etc.

Figure 4.
Percent of Total Centerline Miles by Route System
(Based on 2018 Mileage)



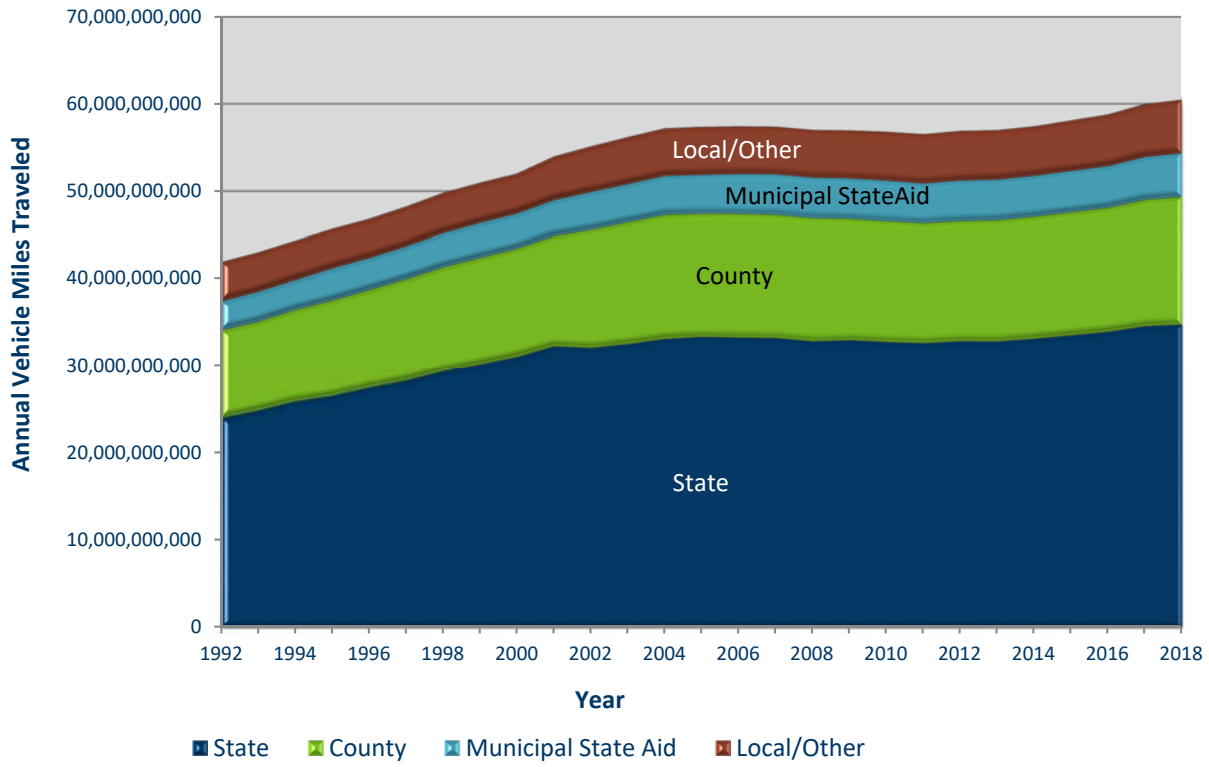
Source: Mn/DOT, Office of Transportation Data and Analysis

Trends in Vehicle Miles of Travel

In 2018, total VMT on all 139,591 miles of roads in Minnesota was 60.4 billion[5]. The state trunk highway system, made up 57.5% of total VMT, but only 8.4% of total centerline miles. Figure 4 shows the proportions of mileage in Minnesota by route system.

Figure 5 shows the statewide annual trends in VMT from 1992-2018 by jurisdiction for all public roads in Minnesota. For those years VMT has increased a total of 44.2%.

Figure 5. Statewide VMT Growth Trends in Minnesota by Jurisdiction: 1992 - 2018

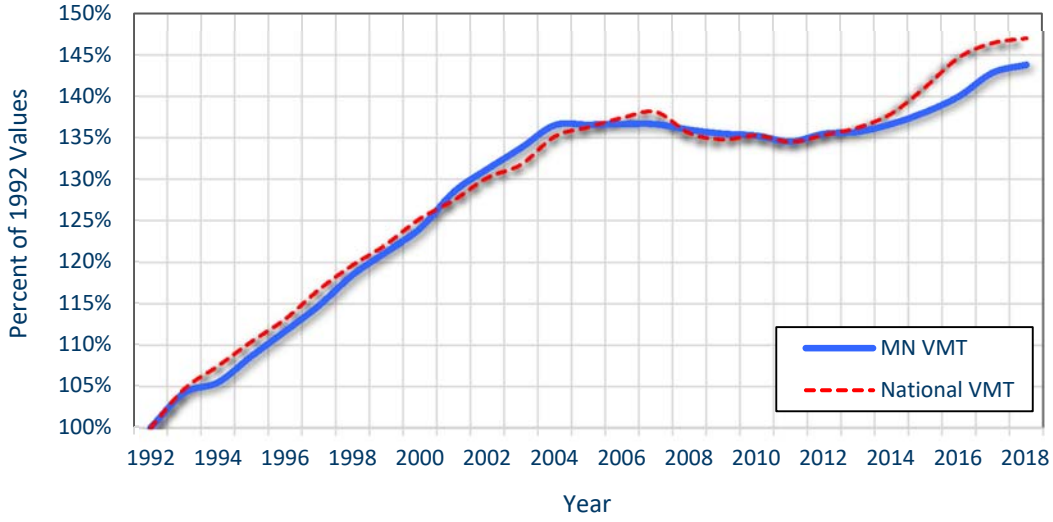


Source: Mn/DOT, Office of Transportation System Management

5. It is the actual number and it did not adjust for leap year.

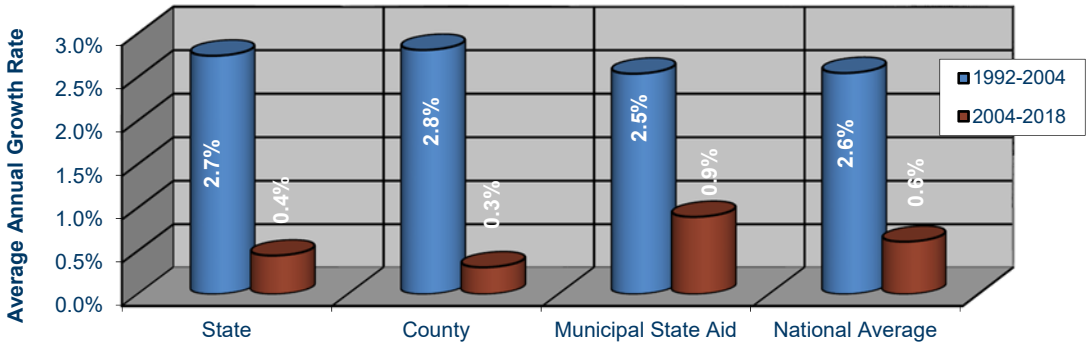
From 1992 to 2018, VMT growth on all roads in Minnesota averaged about 1.4% per year while the national average was 1.5%. Figure 6 shows the Minnesota statewide annual VMT growth compared to the national growth for all roads.

Figure 6. Minnesota -vs- National VMT 1992-2018



Since the year 2004, Minnesota has seen a change in VMT growth trends. The chart in Figure 7 shows VMT growth from 1992-2004 and from 2004-2018 by jurisdiction. While the growth on state trunk highways from 1992-2004 was higher at 2.7% per year, it has since slowed down to 0.4% for years 2004-2018. Growth on the county and municipal system has also slowed for 2004-2018.

Figure 7. Average Annual Growth Rates in VMT by Jurisdiction 1992-2004 & 2004-2018



Sources: Mn/DOT, Office of Transportation Data and Analysis
FHWA Highway Statistics

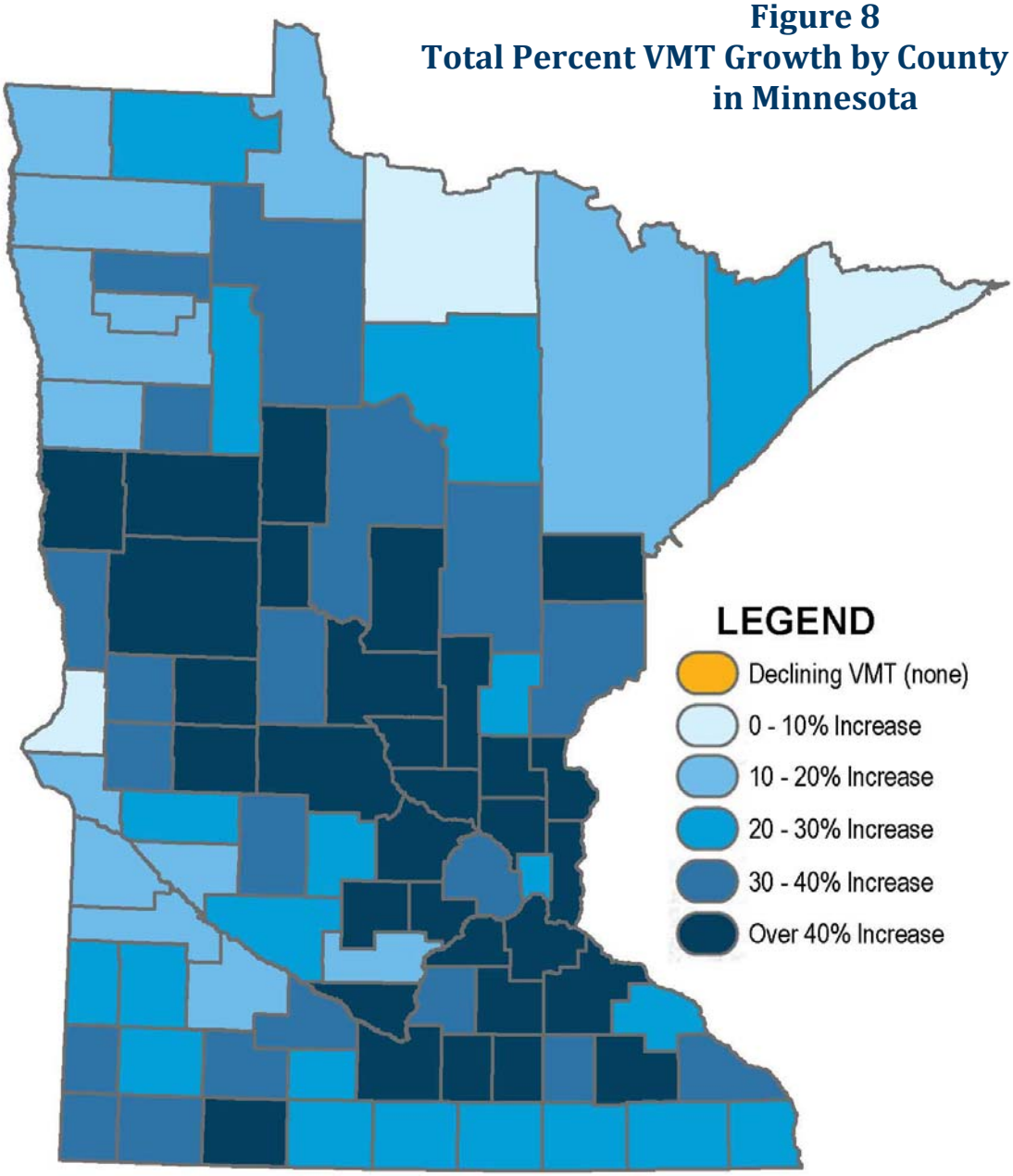
VMT growth was flat from 2004 to 2013, but in 2014 it began increasing again. The economic downturn appears to have had some impact on the total number of miles driven. As the economy improves we are seeing an increase, but not near the growth that we had seen prior to 2004.

Trends in Vehicle Miles of Travel by County

As shown in Figure 8 the highest percent growth in VMT in Minnesota has been in the counties surrounding the Twin Cities. When looking at the absolute growth by county for 1992-2018 Carver was the fastest growing at 107.1%. The other six counties with the highest VMT growth are: Scott (91.2%), Wright (86.3%), Dakota (82.4%), Sherburne (79.8%), Washington (71.3%), and Chisago (71.4%). Each of these counties had a total growth of more than 70%. See Appendix A for a complete list of counties.

The slowest percent growth in VMT occurred in the more rural counties in the state including Koochiching, Cook, and Traverse counties with total growth less than 10% for the same time period from 1992 - 2018.

Figure 8
Total Percent VMT Growth by County on all Roads in Minnesota



Source: Mn/DOT, Office of Transportation System Management

Figure 9 and Figure 10 show the total percent changes in population and employment from 1992 to 2018. In general, the biggest increases in VMT correspond to area with higher increases in population and employment.

Figure 9
Total Percent Population Growth
1992 – 2018

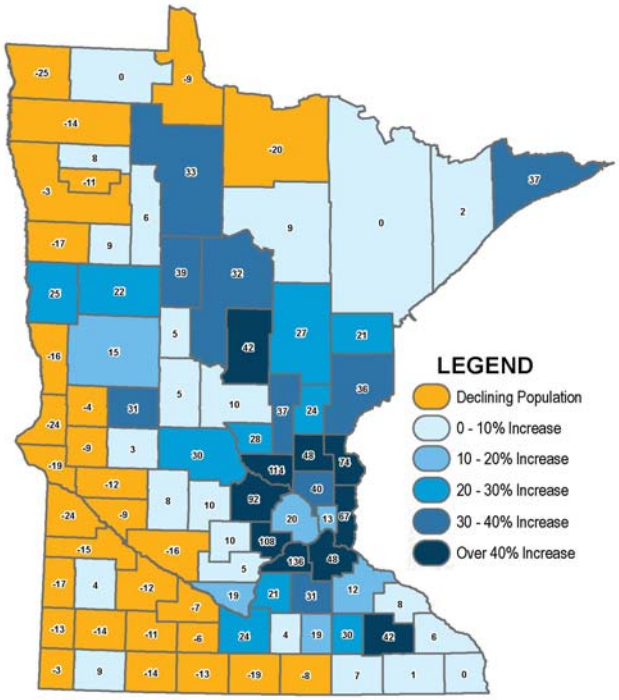
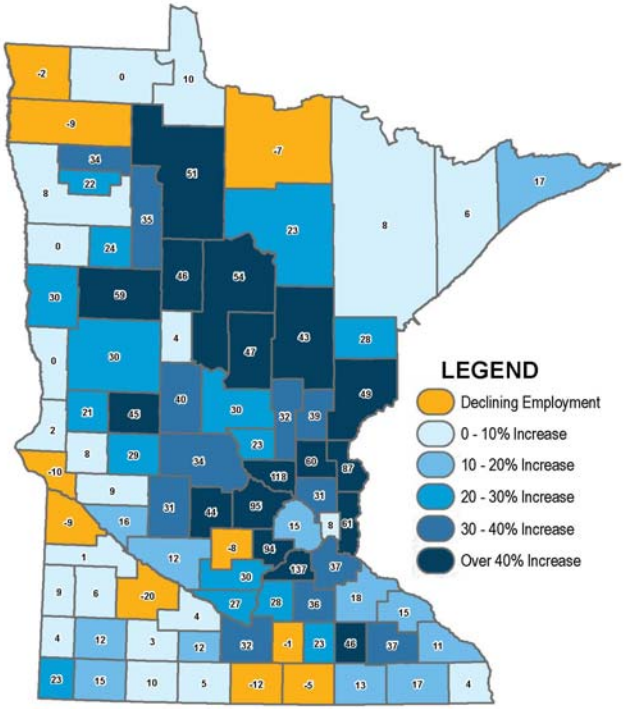


Figure 10
Total Percent Employment Growth
1992 – 2018



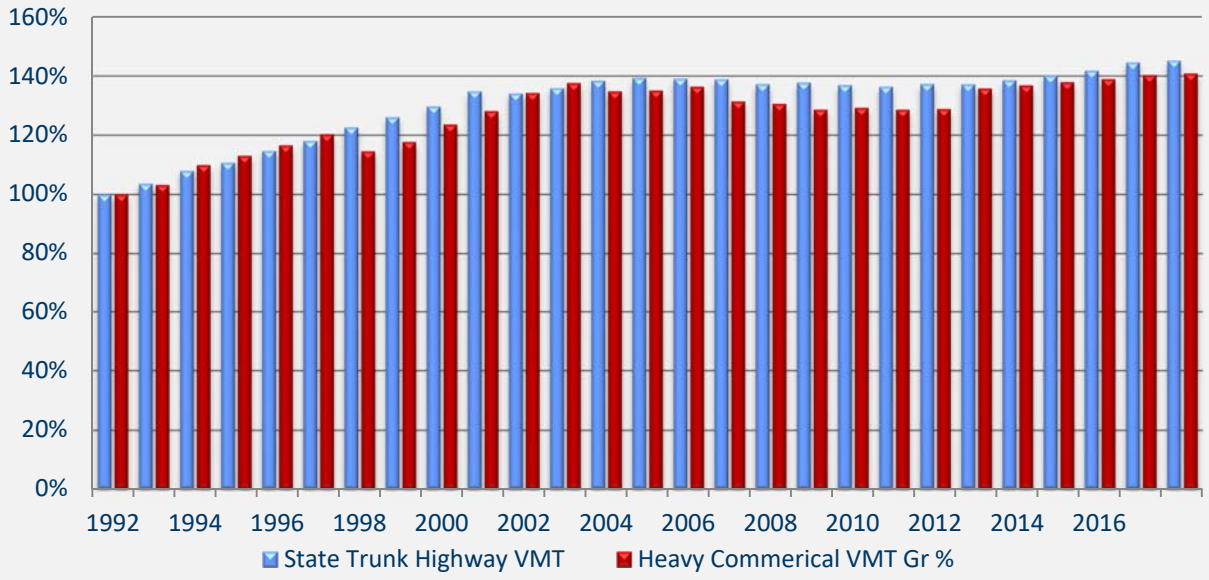
Source: Minnesota State Demographic Center,
Minnesota Department of Employment and Economic Development

Heavy Commercial VMT

HCVMT trends can only be accurately calculated on the state roads because until recently MnDOT only collected heavy commercial traffic data on the state trunk highway system. In 2018 HCVMT made up about 8.1% of total VMT on state roads. During the time period from 1992-2018, the total VMT on state trunk highways has increased 45.2% (average annual rate of 1.5%), while the HCVMT has increased 40.7% (average annual rate of 1.4%).

Figure 11 shows the annual changes in VMT compared to HCVMT on state trunk highways from 1992 – 2018, indexed to 1992 values. While the HCVMT was decreasing at a faster rate than total VMT with the economic downturn, it has recovered and increased since 2012 to a rate that matches the rate for total traffic.

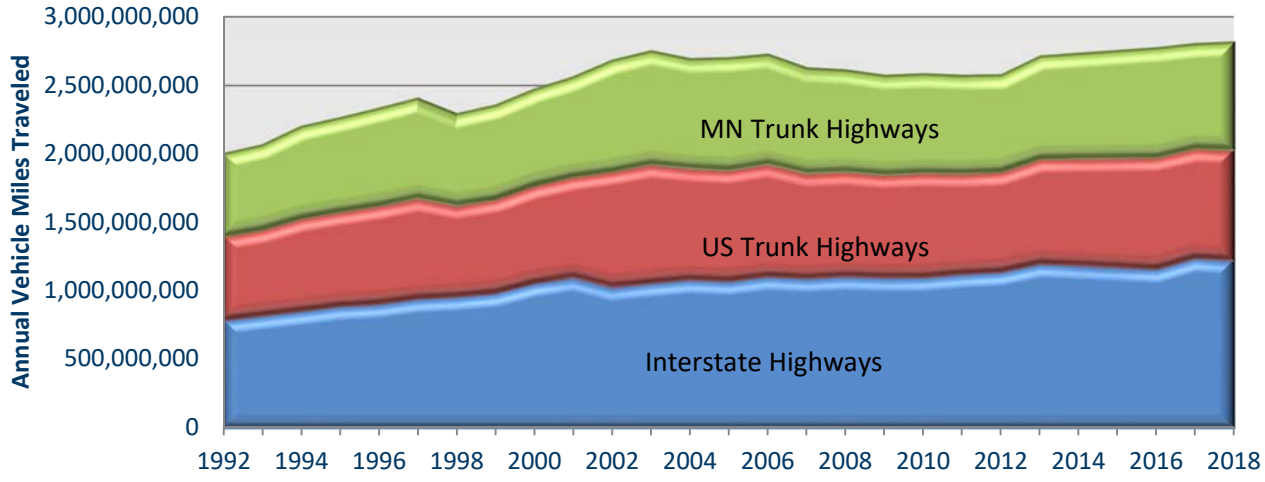
Figure 11
Statewide Annual VMT Growth Trends:1992-2016
Indexed to 1992 Values



Source: Mn/DOT, Office of Transportation System Management

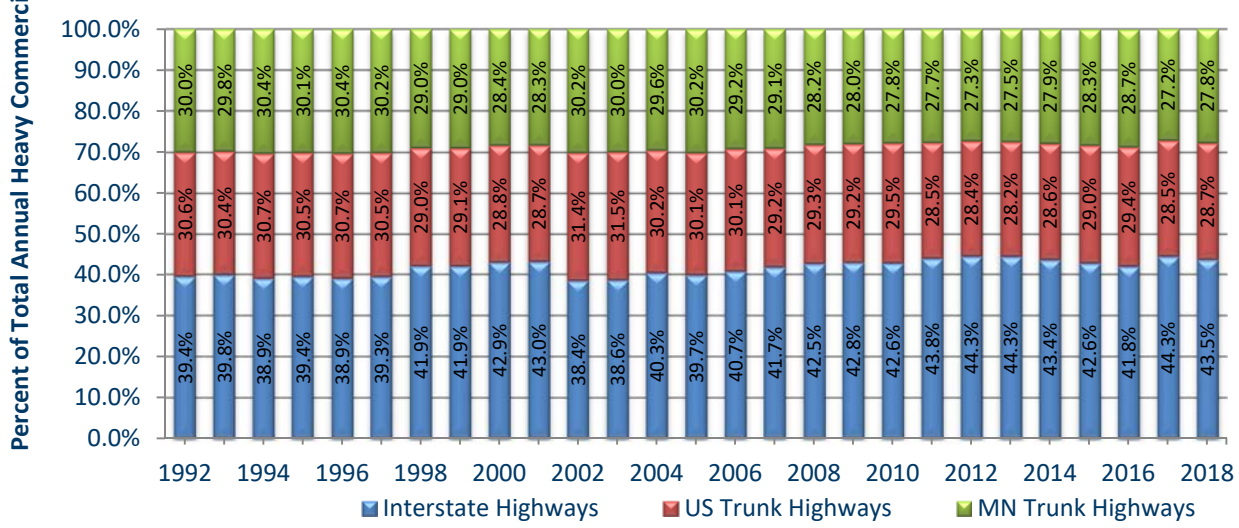
The following two figures show the trends in HCVMT by system types on Minnesota trunk, U.S. trunk, and interstate highways for 1992-2018. Figure 12 shows the trends along with the proportions of each roadway system type, and Figure 13 shows the percentage of total HCVMT for each of these systems. Although there have been some variations, the proportions have remained fairly constant with MN trunks at about 27.3%, U.S. trunks 28.0% and interstates with about 44.7% of the total share on state trunk highways.

Figure 12
Statewide Heavy Commercial VMT Growth Trends on State Roads
by System: 1992-2018



Source: Mn/DOT, Office of Transportation System Management

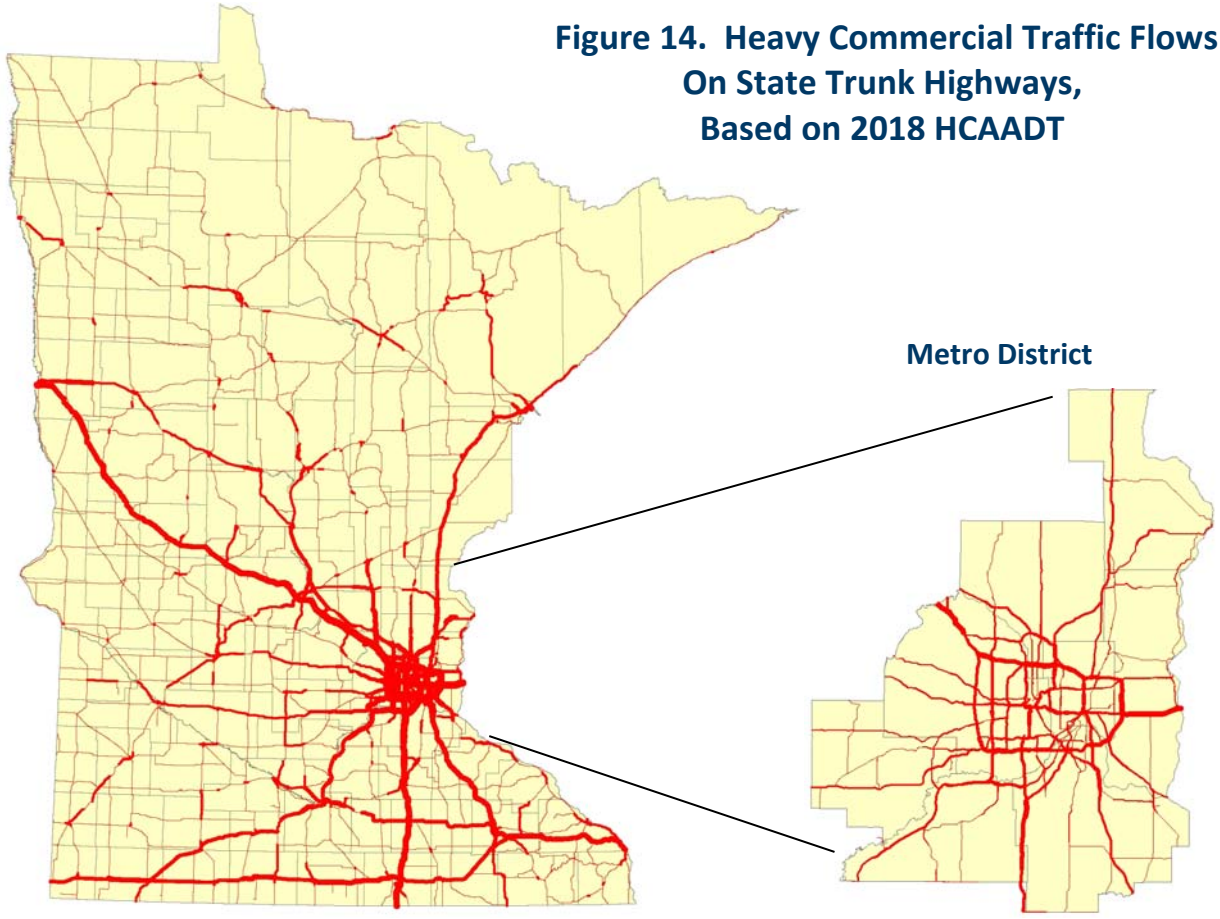
Figure 13
Share of Heavy Commerical VMT on State Roads by System 1992-2018



Source: Mn/DOT, Office of Transportation System Management

In Minnesota, the majority of the heavy commercial traffic occurs on the interstate system and in the Twin Cities metro area. Figure 14 shows the relative volume flows of heavy commercial traffic on state highways throughout the state. In greater Minnesota, highways 10, 52, and 169 carry a large share of the heavy commercial traffic on the non-interstate system.

Figure 14. Heavy Commercial Traffic Flows On State Trunk Highways, Based on 2018 HCAADT



Summary

The vehicle-miles of travel had been increasing for decades in Minnesota, but since the year 2004 traffic has remained at about the same level. However, VMT growth in Minnesota was virtually flat from 2004 to 2013. In 2014 VMT began increasing again to a new high of 60.4 billion in 2018, and nationally VMT has increased to a new high of 3,224.9 billion miles in 2018.

In recent years the highest growth in VMT in Minnesota has been in the counties surrounding the Twin Cites while the growth has slowed or declined on many of the rural counties. Due to factors such as the economic environment we anticipate, at least in the near-term, that VMT will continue to remain flat or slightly increase, but at a more moderate rate than Minnesota has seen over the past decades.

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Appendix A

Qualifications for 2018 VMT Data

There are many conditions to be considered when using VMT data from TIS, especially when performing VMT trend analysis.

1. When traffic volumes are unavailable for individual sections of road in a given year the traffic volumes from an earlier year are annually adjusted and used in VMT calculation. Therefore, this report will not reflect the traffic volumes from the publication year in all cases.
2. The mileage for any given publication year is captured when the reports are created. The mileage is captured each year at or around December 31st. Historical mileage that corresponds to the traffic volume year cannot be regenerated once the publication year has passed.
3. The official VMT reports available at: http://www.dot.state.mn.us/roadway/data/data-products.html#VMT are based on mileage from the year they were created. Comparing the VMT totals from these reports for consecutive years is invalid. For the purpose of comparison, the historic VMT information should be reported using the current year's mileage.
4. Consecutive year VMT comparisons (using the current mileage) should only be used as an estimate of Statewide VMT changes. Cross year comparisons of VMT at the county level are valid only when "actual" data is used (from counted year to counted year) and the data is reported using the current mileage. Traffic counting schedules are available online at: http://www.dot.state.mn.us/traffic/data/coll-methods.html#TVP
5. VMT for Leap Years is reported as 366 days worth of traffic. This must be normalized to 365 days when comparing with non-leap years.
6. Addition of new roadways can create artificial "increases" in VMT that are not due to growth on pre-existing routes.
7. HCADT counts are on a different schedule than AADT counts. For more information on this data contact John Hackett at 651-366-3851. The conditions above should also be considered for HCVMT analysis.
8. Information supplied by other sources (including federal agencies) may vary from the information supplied by this office.
9. VMT for 2015 is not available due to MnDOT migrating to a new linear referencing system (LRS).

The following notes consist of information specific to the 2008 VMT data:

1. The addition of the "New" 212 in Carver County increased VMT on U.S. Highway Routes in that county by 34% over 2007.
2. The update of AADT on MSAS roadways in New Prague increased VMT on MSAS Routes in that county by 300% over 2007.

The following notes consist of information specific to the 2009 VMT data:

1. Due to the opening of the "New" 212 in Carver County in 2008, VMT on local roadways in the surrounding area has decreased while VMT on U.S. Highway Routes has increased.
2. The update of AADT on MSAS roadways in Kasson increased VMT on MSAS Routes in Dodge County by 115% over 2008.
3. The update of AADT on MSAS roadways in Wyoming increased VMT on MSAS Routes in Chisago County by 20% over 2008.

The following notes consist of information specific to the 2010 VMT data:

1. In Carver County traffic patterns have changed significantly as a result of the "New" 212. Trunk Highway 912C ("Old" 212) saw a major decrease in AADT due to these changes. Therefore Minnesota Trunk Routes (system 3) saw a major decrease in VMT.
2. Many miles were added to tribal and state forest routes in 2010.

The following notes consist of information specific to the 2013VMT data:

1. The I-35 construction project in St. Louis County significantly impacted VMT. This is a temporary shift and should recover after project completion.

Appendix B

Total growth of VMT from 1992-2018 in Minnesota shown by county

County Name	All Systems	State System	Local System	Centerline Miles
AITKIN	34.9%	32.2%	43.7%	1750.13
ANOKA	55.9%	51.0%	60.5%	2389.19
BECKER	52.8%	53.2%	52.3%	2152.73
BELTRAMI	38.0%	44.5%	31.7%	2342.58
BENTON	54.1%	63.4%	39.0%	966.98
BIG STONE	19.6%	25.7%	10.9%	932.75
BLUE EARTH	41.2%	48.7%	33.9%	1729.11
BROWN	32.1%	29.3%	34.3%	1213.02
CARLTON	46.8%	55.7%	31.0%	1191.50
CARVER	107.1%	86.5%	132.8%	1116.49
CASS	37.3%	38.0%	35.9%	2546.47
CHIPPEWA	17.0%	17.0%	17.1%	1205.06
CHISAGO	71.4%	58.7%	100.3%	1141.66
CLAY	55.1%	53.7%	57.5%	2092.10
CLEARWATER	28.0%	29.8%	25.7%	1220.67
COOK	3.6%	-8.7%	40.6%	863.20
COTTONWOOD	30.6%	43.6%	19.0%	1262.48
CROW WING	62.1%	60.1%	64.3%	2034.65
DAKOTA	82.4%	88.6%	75.8%	2593.19
DODGE	36.3%	18.4%	72.2%	915.33
DOUGLAS	68.8%	51.1%	100.0%	1538.06
FARIBAULT	21.5%	31.8%	6.7%	1441.83
FILLMORE	22.2%	18.6%	26.9%	1599.26
FREEBORN	29.0%	40.9%	8.8%	1546.95
GOODHUE	50.7%	43.0%	70.1%	1627.20
GRANT	38.5%	52.7%	8.3%	1056.53
HENNEPIN	32.7%	37.9%	25.9%	5325.75
HOUSTON	27.0%	30.7%	20.6%	920.03
HUBBARD	45.5%	42.0%	51.9%	1480.73
ISANTI	67.9%	54.4%	89.5%	1060.07
ITASCA	23.5%	21.5%	26.3%	3249.56
JACKSON	46.5%	61.1%	23.7%	1411.97
KANABEC	20.5%	7.8%	53.1%	834.29

KANDIYOHI	31.1%	39.0%	23.6%	1693.88
KITTSON	17.8%	26.8%	8.9%	1546.84
KOOCHICHING	3.8%	6.8%	-3.3%	1314.66
LAC QUI PARLE	15.1%	20.5%	9.5%	1466.19
LAKE	24.7%	12.2%	48.5%	971.24
LAKE OF THE WOODS	10.4%	14.6%	4.2%	785.03
LE SUEUR	35.8%	18.0%	61.5%	1043.94
LINCOLN	23.0%	30.3%	17.0%	1051.14
LYON	28.7%	26.8%	31.7%	1465.97
MCLEOD	43.2%	44.2%	42.2%	1109.92
MAHNOMEN	37.5%	30.2%	51.2%	727.96
MARSHALL	15.0%	28.2%	7.0%	2801.52
MARTIN	25.2%	28.1%	22.3%	1497.32
MEEKER	27.7%	25.4%	31.7%	1287.96
MILLE LACS	62.7%	64.6%	56.8%	1039.22
MORRISON	52.3%	62.5%	37.4%	1909.89
MOWER	25.5%	31.1%	18.0%	1565.02
MURRAY	20.7%	27.0%	14.9%	1375.77
NICOLLET	52.2%	46.1%	66.7%	897.52
NOBLES	32.9%	53.6%	9.5%	1499.37
NORMAN	12.5%	10.3%	15.2%	1504.13
OLMSTED	67.1%	48.4%	93.8%	1839.34
OTTER TAIL	45.9%	61.5%	29.1%	3950.20
PENNINGTON	30.5%	35.1%	26.7%	1114.57
PINE	30.3%	31.5%	27.4%	1932.26
PIPESTONE	31.1%	37.0%	24.3%	956.93
POLK	17.6%	11.5%	24.8%	3596.08
POPE	43.7%	59.5%	21.7%	1229.40
RAMSEY	23.7%	33.1%	11.1%	1918.41
RED LAKE	19.0%	21.2%	16.9%	764.15
REDWOOD	10.3%	9.2%	11.6%	1697.06
RENVILLE	27.1%	28.3%	25.8%	1894.37
RICE	57.8%	64.3%	44.9%	1270.55
ROCK	33.1%	42.2%	19.1%	1006.37
ROSEAU	26.5%	20.6%	34.2%	2178.33
ST LOUIS	19.1%	24.8%	13.7%	5727.44
SCOTT	91.2%	82.5%	100.0%	1320.22
SHERBURNE	79.8%	60.4%	114.6%	1307.50
SIBLEY	19.0%	10.8%	30.8%	1134.20
STEARNS	63.7%	72.8%	54.2%	3218.24
STEELE	50.0%	48.3%	52.7%	984.65
STEVENS	32.0%	47.3%	16.3%	1049.84
SWIFT	24.9%	32.5%	15.8%	1406.86
TODD	37.5%	42.8%	30.3%	1862.90
TRAVERSE	9.6%	22.1%	-1.1%	1083.71
WABASHA	27.8%	15.2%	49.7%	985.85
WADENA	52.1%	58.6%	44.0%	938.09
WASECA	43.1%	42.0%	44.4%	871.51
WASHINGTON	71.3%	54.3%	99.1%	1950.35
WATONWAN	30.0%	35.4%	22.7%	883.08
WILKIN	34.1%	39.2%	22.9%	1397.30
WINONA	33.5%	41.6%	16.6%	1225.88
WRIGHT	86.3%	70.8%	114.0%	2084.35
YELLOW MEDICINE	18.1%	22.1%	13.5%	1504.79